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For calculating $\varkappa$, which depends both on the zenith distance and on the barometer and thermometer readings, the following empirical formula is sufficiently accurate and of ready computation:—

$$\text{Log}\ \varkappa = \text{Log}\ k + 0{\cdot}015\ \text{B} + 0{\cdot}001\ (100^\circ - \text{T}),$$

where Log k is Log α'' (in Bessel's Table, pp. 198 and 199 of the work already cited) diminished by the constant 0·4957, B is the barometer reading in English inches, and T is the thermometer reading in degrees of Fahrenheit (Bessel's Log α'' takes account approximately of the variation depending on zenith distance of the factor A in the expression, A tan zen. dist. for the total refraction). To select the proper value of Log k, the argument zenith distance (z) is first obtained by the formula, sec z = sec Q Z sec (Δ — P Q). The calculations are much facilitated by the formation of two tables; one containing the values of P Q, Log sec Q Z, and Log $\frac{\tan \text{QZ}}{15}$, for every ten minutes of hour-angle from 0^{h} to 6^{h}, whence, by interpolation, and by proper attention to changes of sign, the values may be obtained for any given hour-angle; the other, a table of values of Log k, in which the argument is z, or, which is preferable, Log sec z, the difference between the consecutive logarithms being 0·01.

In an instance in which the apparent difference of north polar distance was 32′·1, the hour-angle $3^{\text{h}}\,49^{\text{m}}{\cdot}7$, and the zenith distance 82°·3, the corrections calculated by the above approximate formulæ were 18″·12 and $0^{\text{s}}{\cdot}769$. By exact calculation they were found to be 18″·27 and $0^{\text{s}}{\cdot}762$.

When differences of right ascension and north polar distance are measured while the equatoreal is carried by clock-movement (which is sometimes done with the Northumberland equatoreal), it is necessary to compute exactly the total refractions in right ascension and north polar distance of each object, no other method appearing to possess sufficient accuracy.

Extract of a Letter from Mr. Alfred Weld, Director of the Observatory at Stoneyhurst College.

"On September 20, I observed a large spot on the sun with our equatoreal, and found that it consisted of several dark nuclei enveloped in one large penumbra. On the 21st, I made several observations, from which I deduced the following values of the angles subtended by the spot and nucleus:—

	′	″
Greatest diameter of spot	2	41·1
——— nucleus	1	7·2
Equatoreal diameter of spot	2	14·1
——— nucleus	0	49·2
Meridian diameter of spot...........	2	14·1

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"The spot was distinctly visible to the naked eye before sunset."

By comparisons with δ *Ophiuchi*, *Spica*, and *Antares*, Mr. Weld found the declination of Mr. Hind's changing star to be $-12^\circ\ 37'\ 15''$.

NOTICE OF THE PRINCIPAL ENGLISH OBSERVATORIES.

EXTRACTED FROM OFFICIAL OR DIRECT SOURCES.

It has been thought advisable to insert a brief account of our principal Observatories in the *Monthly Notices*, as, notwithstanding the great liberality with which their publications are distributed, and their observations communicated, many members may not be sufficiently acquainted with their condition. Two British Observatories only, are, properly speaking, public — those of Greenwich and Edinburgh. The Observatory of Oxford was built and is supported by a bequest under Dr. Radcliffe's will: it is under the control of private trustees. The Cambridge Observatory was erected principally by private subscription, and is supported in part by the funds of a professorship founded by Dr. Plume, but mainly out of the University chest. The Radcliffe observer makes an annual report to his trustees; and Visitors appointed by the Cambridge Senate draw up yearly a statement to be laid before that body. Since the appointment of Mr. Airy to the Royal Observatory, a minute Report of all proceedings and changes in that establishment is read to the Board of Visitors at the Annual Visitation in June.

Greenwich.

It has been mentioned in former numbers that the Meridional Instruments at Greenwich are deficient in optical power, and that the Astronomer Royal proposed to replace the Mural Circle and Transit by a single instrument, viz. a Transit Circle, which is to be erected on the site of the present circle-room. In his Report to the Visitors, Mr. Airy says:—

"An object-glass of 8 inches clear aperture and 11 feet 6 inches focal length having been placed in my hands by Mr. Simms, I carefully examined it. I found that it shewed some objects not of the closest class (as ε *Boötis* and ζ *Cancri*) better, I think, than I had seen them before: that it separated η *Coronæ*; that it did not separate γ *Coronæ* (which, having witnessed the difficulty of that star in the great Pulkowa refractor, I was prepared to expect); and that it dispersed light no more than the best object-glasses usually do. At my recommendation, therefore, this object-glass was purchased by the Lords Commissioners of the Admiralty, at the price of 275*l*. I have now to explain the form in which I propose to mount it. No verbal description, probably, can dis-

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